

WE CLAIM:

1. A heart positioning device comprising:
  - a resiliently flexible suction head that flexes to conform to the surface of the heart, the suction head having a vacuum passageway in fluid communication with the head to apply suction between the head and the surface of the heart;
  - a shaft having a vacuum lumen extending therethrough, the shaft coupled at a distal end to the suction head;
  - a handle coupled to a proximal end of the shaft for remote manipulation of the position of the suction head; and
  - means for remotely changing the position of the head from a first position axially aligned with the shaft to a second, unaligned position.
2. A heart positioning device according to claim 1 wherein the suction head includes at least three resilient legs in fluid communication with the vacuum passageway.
3. A heart positioning device according to claim 1 wherein the suction head is resiliently compressible from a first, uncompressed condition, to a second, compressed condition upon application of a constraint.
4. A heart positioning device according to claim 3 wherein the head is adapted at its second, compressed condition for slideable introduction of the compressed head through a port.
5. A heart positioning device according to claim 3 wherein the head in its compressed condition is adapted to resiliently return to the first, uncompressed condition upon release of the constraint.

6. A heart positioning device according to claim 1 wherein the means for remotely changing the position of the head comprises a pull wire.

7. A heart positioning device according to claim 1 wherein the means for remotely changing the position of the head comprises a push wire.

8. A heart positioning device according to claim 1 further comprising means to return the head from the second, unaligned position toward the first, axially aligned position.

9. A heart positioning device according to claim 8 wherein the means to return the head comprises spring means.

10. A heart positioning device according to claim 1 further comprising means for locking the position of the head in the second, unaligned position.

11. A heart positioning device according to claim 1 wherein the second, unaligned position is about 90 degrees from the first, axially aligned position.

12. A heart positioning device comprising:

a resiliently flexible suction head that flexes to conform to the surface of the heart, the suction head having a vacuum passageway in fluid communication with the head to apply suction between the head and the surface of the heart;

a shaft having a vacuum lumen extending therethrough, the shaft coupled at a distal end to the suction head;

a handle coupled to a proximal end of the shaft for remote manipulation of the position of the suction head; and

a sleeve slideably positioned on the shaft and sized to receive the suction head in a compressed condition such that the sleeve may be slideably advanced over the shaft to capture the suction head at the distal end thereof.

13. A heart positioning device according to claim 12 wherein the suction head includes at least three resilient legs in fluid communication with the vacuum passageway.

14. A heart positioning device according to claim 13 wherein the head is adapted at its compressed condition for slideable introduction of the compressed head through a port.

15. A heart positioning device according to claim 12 wherein the head in its compressed condition is adapted to resiliently return to an uncompressed condition upon release from the sleeve.

16. A heart positioning device according to claim 12 wherein the positioning device includes a retaining member for retaining the sleeve in a proximal position on the shaft.

17. A heart positioning device according to claim 12 wherein the sleeve is adapted for use as a port extending within an incision into a chest cavity of a patient.

18. A heart positioning device according to claim 12 wherein the sleeve is adapted to capture the suction head when the suction head is axially aligned with the shaft.

19. A heart positioning device comprising:

a resiliently flexible suction head that flexes to conform to the surface of the heart, the suction head having a vacuum passageway in fluid communication with the head to apply suction between the head and the surface of the heart;

a shaft having a vacuum lumen extending therethrough, the shaft coupled at a distal end to the suction head;

a handle coupled to a proximal end of the shaft for remote manipulation of the position of the suction head; and

a sleeve slideably positioned on the shaft such that the suction head may be advanced or retracted with respect to the sleeve by manipulation of the handle.

20. A heart positioning device according to claim 19 wherein the suction head includes at least three resilient legs in fluid communication with the vacuum passageway.

21. A heart positioning device according to claim 19 wherein the positioning device includes a retaining member for retaining the sleeve in a proximal position on the shaft.

22. A heart positioning device according to claim 19 wherein the sleeve is adapted for use as a port extending within an incision into a chest cavity of a patient.

23. A method of performing a surgical procedure on a heart, comprising:

providing a heart positioning device having a resiliently flexible suction head that flexes to conform to the surface of the heart, the suction head having a

vacuum passageway in fluid communication with the head to apply suction between the head and the surface of the heart, a shaft having a vacuum lumen extending therethrough coupled at a distal end to the suction head and a handle coupled to a proximal end of the shaft;

introducing the suction head of the positioning device into a chest cavity of a patient through an incision;

remotely changing the position of the suction head from a first position axially aligned with the shaft to a second, unaligned position while the suction head is within the chest cavity;

engaging the heart with the suction head;

positioning the heart into a non-physiological orientation; and

performing a surgical procedure on the heart.

24. A method according to claim 23 wherein engaging the heart with the suction head includes engaging the heart with at least three resilient legs of the suction head.

25. A method according to claim 23 wherein the suction head is introduced into the chest cavity of the patient by resiliently compressing the suction head from a first, uncompressed condition, to a second, compressed condition.

26. A method according to claim 25 wherein the suction head is introduced into the chest cavity of the patient by slideably introducing it through a port.

27. A method according to claim 23 wherein the position of the head is remotely changed by activating a pull wire.

28. A method according to claim 23 wherein the position of the head is remotely changed by activating a push wire.

29. A method according to claim 23 wherein the position of the head is remotely changed from a control on the handle.

30. A method according to claim 23 further comprising returning the head from the second, unaligned position toward the first, axially aligned position and removing the head from the chest cavity through the incision.

31. A method according to claim 23 further comprising securing the position of the heart positioning device prior to the surgical procedure and releasing the position of the heart positioning device after the procedure.

32. A method according to claim 31 wherein securing the position of the heart positioning device is accomplished by clamping the heart positioning device to an arm.

33. A method according to claim 31 wherein securing the position of the heart positioning device is accomplished by actuating an arm attached to the heart positioning device to render the arm rigid.

34. A method of performing a surgical procedure on a heart, comprising:  
providing a heart positioning device having a resiliently flexible suction head that flexes to conform to the surface of the heart, the suction head having a vacuum passageway in fluid communication with the head to apply suction between the head and the surface of the heart, a shaft having a vacuum lumen

extending therethrough coupled at a distal end to the suction head, a handle coupled to a proximal end of the shaft and a sleeve slideably positioned on the shaft;

advancing the sleeve along the shaft to receive the suction head in a compressed condition;

introducing the sleeve and compressed suction head of the positioning device into an incision extending into a chest cavity of a patient;

advancing the suction head from the sleeve such that it achieves an uncompressed condition;

engaging the heart with the suction head;

positioning the heart into a non-physiological orientation; and

performing a surgical procedure on the heart.

35. A method according to claim 34 wherein engaging the heart with the suction head includes engaging the heart with at least three resilient legs of the suction head.

36. A method according to claim 34 wherein positioning of the heart is accomplished by remotely manipulating the suction head by moving the handle.

37. A method according to claim 34 further comprising securing the position of the heart positioning device prior to the surgical procedure and releasing the position of the heart positioning device after the procedure.

38. A method according to claim 37 wherein securing the position of the heart positioning device is accomplished by clamping the heart positioning device to an arm.

39. A method according to claim 37 wherein securing the position of the heart positioning device is accomplished by actuating an arm attached to the heart positioning device to render the arm rigid.

40. A method of performing a surgical procedure on a heart, comprising:

providing a heart positioning device having a resiliently flexible suction head that flexes to conform to the surface of the heart, the suction head having a vacuum passageway in fluid communication with the head to apply suction between the head and the surface of the heart, a shaft having a vacuum lumen extending therethrough coupled at a distal end to the suction head, a handle coupled to a proximal end of the shaft and a sleeve slideably positioned on the shaft;

advancing the sleeve long the shaft to receive the suction head in a compressed condition;

introducing the sleeve and compressed suction head of the positioning device at least partially into a port extending into a chest cavity of a patient;

advancing the suction head from the sleeve into the port and into the chest cavity such that it achieves an uncompressed condition;

engaging the heart with the positioning device;

positioning the heart into a non-physiological orientation; and

performing a surgical procedure on the heart.

41. A method according to claim 40 wherein engaging the heart with the suction head includes engaging the heart with at least three resilient legs of the suction head.

42. A method according to claim 40 wherein positioning of the heart is accomplished by remotely manipulating the suction head by moving the handle.

43. A method according to claim 40 further comprising securing the position of the heart positioning device prior to the surgical procedure and releasing the position of the heart positioning device after the procedure.

44. A method according to claim 43 wherein securing the position of the heart positioning device is accomplished by clamping the heart positioning device to an arm.

45. A method according to claim 43 wherein securing the position of the heart positioning device is accomplished by actuating an arm attached to the heart positioning device to render the arm rigid.

46. A system for performing a medical procedure comprising:

a resiliently flexible suction head that flexes to conform to the surface of the heart, the suction head having a vacuum passageway in fluid communication with the head to apply suction between the head and the surface of the heart; a shaft having a vacuum lumen extending therethrough, the shaft coupled at a distal end to the suction head such that the suction head can be remotely moved from a first position axially aligned with the shaft to a second, unaligned position; a handle coupled to a proximal end of the shaft for remote manipulation of the position of the suction head;

a port adapted to receive the suction head with the suction head in a compressed condition when the suction head is in the first, axially aligned condition; and

a suction source in fluid communication with the heart positioning device.

47. A system for performing a medical procedure comprising:

a resiliently flexible suction head that flexes to conform to the surface of the heart, the suction head having a vacuum passageway in fluid communication with the head to apply suction between the head and the surface of the heart; a shaft having a vacuum lumen extending therethrough, the shaft coupled at a distal end to the suction head, a handle coupled to a proximal end of the shaft for remote manipulation of the position of the suction head and a sleeve slideably positioned on the shaft and sized to receive the suction head in a compressed condition such that the sleeve may be slideably advanced over the shaft to capture the suction head at the distal end thereof;

a port adapted to receive at least a portion of the sleeve and the suction head with the suction head in a compressed condition within the sleeve; and

a suction source in fluid communication with the heart positioning device.